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# Documenting your Code

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# DOCUMENTATION

# Why is documentation important?

- To identify the purpose of the software and its requirements
- To clarify what each component does, what is needed to maintain it, and how it can be reused elsewhere
- To provide user support
  - Minimizes unnecessary handholding of users
- To ensure that software is used within its region of validity
  - Minimizes possibility of producing spurious scientific results

# Categories of documentation

- Users guide
- Reference manual
  - List of the interfaces and routines and explanation of functionality
  - Can be generated automatically from code
- Readme files
- Installation guide
- Tutorials

All software needs documentation  
Not all software needs a users guide

# What is Trilinos?

- A collection of libraries intended to be used as building blocks for the development of scientific applications
- Organized into 66 packages
  - Linear solvers
  - Nonlinear solvers
  - Eigensolvers
  - And more!
- 10,000+ commits
- 135 contributors (according to github)
- Millions of lines of code

# How does Trilinos handle documentation?

- Each package does it differently
- User manuals
  - MueLu (algebraic multigrid)
  - AztecOO (Krylov solvers)
  - Teuchos RCP (reference counted pointers)
- Publicly available tutorials, presentations, and slides
  - Tpetra (MPI+X linear algebra)
  - Kokkos
- Well commented examples
- Automatically generated html documentation

# Doxygen

- One approach to producing “reference manual”-like documentation
- Automatically generates html (or LaTeX) documentation from comments in source code
- Easy to update documentation when source code is updated
- Takes Doxyfile as input
- doxywizard - GUI frontend for doxygen
  - Generates Doxyfile for you

# Doxygen demo

- A small linear algebra package: Morpheus
  - Available at <https://github.com/amklinv/morpheus>
- We will document the Vector class
- This linear algebra package will also be used in the software testing hands-on session tonight